United Comstock Merger Mill at American Flat

Environmental Assessment

December 2010

Appendix A

Environmental Analysis Assumptions and Calculations

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1 Introduction

The United Comstock Merger Mill at American Flat Environmental Assessment (EA) was conducted to evaluate the impacts to the natural and human environment from a proposed action to mitigate hazards to human health from the United Comstock Merger Mill at American Flat (AFM). In developing the EA, various assumptions and calculations were made to qualify and quantify the natural and human environmental conditions that would be affected by the various alternatives addressed.

Costs for each alternative were developed based on proposed actions as follows:

- Alternative 1 – the No Action Alternative: costs were derived from current BLM AFM costs.
- Alternative 2 – Demolition: volume estimates were derived from the U.S. Army Corp of Engineers (USACE) report (USACE 2010), costs for demolition were based on the alternative actions (Sections 2, 3, 4, and 5 below) and the RS Means Heavy Construction Cost Data Manual (Means 2010) was referenced to determine crew types, equipment types and quantities, labor hours, and construction timelines.
- Alternative 3 – Institutional Controls: costs for security fencing and full time security were based on Means (2010) and other fencing assumptions in Section 7.
- Alternative 4 – Select Building Retention, volume estimates were derived from the USACE report (USACE 2010), costs for demolition were based on the alternative actions (Sections 2, 3, 4, and 5 below) and Means (2010) was referenced to determine crew types, equipment types and quantities, labor hours, and construction timelines. Security fencing was based on Means (2010) and other fencing assumptions in Section 7.

2 Demolition Assumptions

This section describes the assumptions made regarding building demolition for Alternative 2 (Demolition) and Alternative 4 (Selected Building Retention). Demolition techniques for buildings and structures were assumed to include, but were not limited to, the following:

- Excavator with a demolition grapple;
- Concrete saw;
- Concrete water-jet;
- Removal of walls by crane;
- Removal of walls by backhoe; and
- Wrecking ball.

It was assumed that ground-level slabs and foundations would be fractured and left in place following building demolition. Fracture options include, but are not limited to, the following:

- Excavator with a demolition grapple;
- Backhoe with a breaker attachment;
- Jackhammer;
- Pneumatic and hydraulic breakers; and
- Expansive grout.

Because building demolition was not assumed to be selective (i.e., no particular walls, floors, or parts of any building were to be salvaged and other parts demolished), the most straight-

forward demolition estimate provided by Means (2010) was for total building demolition, based on the total volume of the building. Building volumes were roughly estimated based on the drawings and aerial imagery included in the USACE *Final Findings Report for the Assessment of Physical Hazards of Buildings and Facilities, Aerial Survey and Topographic Mapping at American Flat Mill Site, Storey County Nevada* (USACE 2010). Building footprints were multiplied by the approximate height of the building to be demolished. Basement areas not scheduled for demolition were not included in the building volume calculation (e.g., the pit area underlying the rail spur of Building 1, the Ore Bin). For Building 8, only a foundation slab remains. The slab thickness was assumed to be 0.5 feet based on information provided in the USACE report (2010). Building footprints and estimated building volumes are provided in Table A-1.

Table A-1 Estimated Building Footprints, Volumes, and Demolition Crew Days and Labor Hours

Building	Footprint (Square Feet)	Building Volume (Cubic Yards)	Crew Days for Demolition	Labor Hours for Demolition
1 – Ore Bin	3,785	1,542	3	167
2 – Coarse Crushing Plant	8,473	14,122	25	1,526
3 – Fine Grinding & Concentration	16,998	96,324	170	10,403
4 – Cyanide Plant	89,650	92,970	165	10,041
5 – Warehouse	5,666	2,938	6	318
6 – Precipitation & Refining	3,938	4,229	8	457
7 – Assay Office	3,005	1,447	3	157
8 – Substation	2,022	75	1	9

All buildings were assumed to be concrete structures. A type B-8 crew, including the following personnel and equipment, was considered for concrete structure demolition:

- 1 labor foreman;
- 2 laborers;
- 2 medium equipment operators;
- 1 equipment operator oiler;
- 2 heavy truck drivers;
- 1 25-ton hydraulic crane;
- 1 3-cubic yard crawler loader; and
- 2 12-cubic-yard, 400-horsepower dump trucks.

The estimated daily output for the demolition crew was 567 cubic feet of total building volume. This value was used to estimate the number of crew days and labor hours needed to complete demolition of each building, as shown in Table A-1. The crew days and labor hours required for mobilization, demobilization, and implementation of temporary construction best management practices (BMPs), with the exception of dust control, were not incorporated into this EA.

3 Landfilling Assumptions

It was assumed that, concurrent with building demolition, demolition debris would be used to fill building voids. The USACE report (2010) estimated the volumes of demolition debris and the volumes of voids available for landfilling demolition debris at each building location. After filling the voids, all remaining demolition debris would be backfilled into the Building 4 footprint and substructure. The demolition debris, void space, and Building 4 landfill volumes are summarized in Table A-2.

Table A-2 Estimated Demolition Volumes for Landfilling

Building	Volume of Demolition Debris (Cubic Yards)	Building Void Volume (Cubic Yards)	Volume of Demolition Debris for Building 4 Landfill (Cubic Yards)	Crew Days for Backfilling	Labor Hours for Backfilling
1 – Ore Bin	395	50	345	1	2
2 – Coarse Crushing Plant	1,832	1,200	632	1	3
3 – Fine Grinding & Concentration	3,761	2,000	1,761	1	8
4 – Cyanide Plant	609	609	0	0	0
5 – Warehouse	57	0	57	1	1
6 – Precipitation & Refining	469	0	469	1	2
7 – Assay Office	146	0	146	1	1
8 – Substation	83	83	0	1	1

A type B-10M crew, including the following personnel and equipment, was considered for landfilling activities:

- 2 medium equipment operators;
- 0.5 laborer; and
- 1 300-horsepower dozer.

The estimated daily output for the demolition debris landfilling crew was 3,170 cubic yards of debris. This value was used to estimate the number of crew days and labor hours needed to backfill demolition debris into the Building 4 landfill, as shown in Table A-2. The crew days and labor hours required for mobilization, demobilization, and implementation of temporary construction BMPs, with the exception of dust control, were not incorporated into this EA.

It was assumed that all void space (in situ) landfilling activities would be conducted by the demolition crew concurrently with demolition activities. Only the cubic yardage of demolition debris landfilled into the Building 4 substructure was considered for calculating crew days and labor hours. Filling the Building 4 substructure and voids with demolition debris from Building 4 itself was considered to be in situ landfilling conducted by the demolition crew rather than the landfilling crew.

Buildings 5 through 7 do not have basements or other voids in which to dispose of demolition debris; therefore, all demolition debris from those buildings was included in the demolition debris calculations for the Building 4 landfill.

For Building 8, only a foundation slab remains. Although the USACE report (2010) included the Building 8 demolition debris in the Building 4 landfill volume, Alternative 2 of this EA assumed that all ground-level slabs and foundations would be fractured and left in place. The volume of Building 8 demolition debris was therefore not included in the Building 4 landfill volume and associated landfilling crew day and labor calculations.

4 Soil Cover Assumptions

The EA assumed that a vegetated soil cover would be constructed over all disturbed areas following demolition and backfilling activities. To determine the total area of soil cover to be constructed, it was assumed that a 10-foot-wide area of disturbance would surround the footprint of each demolished building. This disturbed area would be covered with soil at least 36 inches deep and comprise native materials excavated from an on-site borrow area. The calculated areas of disturbance and corresponding volumes of soil required to establish 36 inches of coverage are provided in Table -3.

Table A-3 Estimated Areas of Disturbance and Soil Cover Volumes

Building	Area of Disturbance (Square Yards)	Soil Cover Volume (Cubic Yards)	Crew Days for Soil Cover	Labor Hours for Soil Cover
1 – Ore Bin	853	3,456	8	89
2 – Coarse Crushing Plant	1,528	6,186	12	157
3 – Fine Grinding & Concentration	2,754	11,154	19	282
4 – Cyanide Plant	11,371	46,053	78	1,157
5 – Warehouse	1,036	4,196	9	107
6 – Precipitation & Refining	811	3,283	8	84
7 – Assay Office	648	2,625	6	67
8 – Substation	478	1,937	5	51

Several tasks were incorporated into the soil cover construction assumptions including the excavation and hauling of native fill material from an on-site borrow location, grading the soil cover subgrade, and placing and finish grading the soil cover.

A type B-33E crew, including the following personnel and equipment, was considered for excavating, hauling, and placing fill material:

- 1 medium equipment operator;
- 0.5 laborer;
- 0.25 medium equipment operator;
- 1 self-propelled, 21-cubic yard scraper; and

- ¼ push 300-horsepower dozer.

The estimated daily output for the excavation/placement crew was 1,030 cubic yards of fill material (Means 2010).

A type B-11L crew, including the following personnel and equipment, was considered for subgrade and finish grading the soil cover:

- 1 medium equipment operator;
- 1 laborer; and
- 1 30,000-pound grader.

The estimated daily output to grade the soil cover subgrade was 3,500 square yards. The estimated daily output for finish grading was 400 square yards. These daily outputs were used to estimate the number of crew days and labor hours needed to construct the soil cover, as shown in Table A-3. The crew days and labor hours required for mobilization, demobilization, and implementation of temporary construction BMPs, with the exception of dust control, were not incorporated into the EA.

The USACE report (2010) estimated that 3,859 cubic yards of demolition debris could be used to fill on-site voids. The report also estimated that the Building 4 substructure could store 1,600 cubic yards of landfilled demolition debris. Based on these estimates, including the estimated 609 cubic yards of Building 4 demolition debris (USACE 2010) but excluding the 83 cubic yards of Building 8 demolition debris (USACE 2010), excess demolition debris would have to be landfilled on top of the Building 4 substructure. Under Alternative 2, this would include an estimated 2,519 cubic yards of demolition debris. Under Alternative 4, this would include an estimated 132 cubic yards of demolition debris. Various design constraints could affect the final Building 4 soil cover surface area and volume. Therefore, for the purposes of this EA, the Building 4 soil cover surface area and volume were based solely on the Building 4 footprint and assumed area of disturbance. No design assumptions were made regarding the height, slope, or placement of excess demolition debris in the Building 4 landfill.

5 Revegetation Assumptions

The soil cover described in the EA would be seeded with a mix of native grass and shrub species common in the vicinity of the AFM. It was assumed that revegetation would consist of hydro- or air-seeding the constructed soil covers with mulch and fertilizer. The revegetation areas were assumed to be the areas of disturbance provided in Table A-3 above. A type B-81 crew, including the following personnel and equipment, was considered for revegetation activities:

- 1 laborer;
- 1 medium equipment operator;
- 1 heavy truck driver;
- 1 track-mounted hydro-mulcher;
- 1 3-cubic yard crawler loader; and
- 1 220-horsepower truck tractor.

The estimated daily output for the revegetation crew was approximately 9 square yards of revegetation area. This value was used to estimate the number of crew days and labor hours

needed to complete demolition of each building, as shown in Table A-4. The crew days and labor hours required for mobilization, demobilization, and implementation of temporary construction BMPs, with the exception of dust control, were not incorporated into the EA.

Table A-4 Estimated Revegetation Crew Days and Labor Hours

Building	Crew Days for Revegetation	Labor Hours for Revegetation
1 – Ore Bin	1	3
2 – Coarse Crushing Plant	1	5
3 – Fine Grinding & Concentration	1	8
4 – Cyanide Plant	2	31
5 – Warehouse	1	3
6 – Precipitation & Refining	1	3
7 – Assay Office	1	2
8 – Substation	1	2

6 Dust Control Assumptions

Under Alternatives 2 and 4, construction BMPs would be implemented to control impacts such as dust, stormwater run-off, and off-site tracking of soils. Although implementation of most temporary construction BMPs was not incorporated into the crew day and labor hour calculations for the EA, dust control was considered a BMP that would significantly impact the natural and human environmental impact analyses. It was assumed that light dust control, such as water spraying, would be conducted for the duration of construction activities. The number of dust control crew days were estimated as the total number of crew days necessary to complete demolition, landfilling, soil cover construction, and revegetation activities. Table A-5 summarizes the dust control crew days and associated labor hours for Alternatives 1 and 2.

Table A-5 Estimated Dust Control Crew Days and Labor Hours

Alternative	Crew Days for Dust Control	Labor Hours for Dust Control
2 – Demolition	541	4,328
4 – Selected Building Retention	315	2,520

A type B-59 crew, including the following personnel and equipment, was considered for dust control activities:

- 1 heavy truck driver;
- 1 220-horsepower truck tractor; and
- 1 5,000-gallon water tank trailer.

For the purposes of this EA, it was assumed that surface water currently present on site would be characterized as suitable for use in dust control. Therefore, no estimates, assumptions, or

calculations were made to account for hauling water to the AFM site, and no estimates, assumptions, or calculations were made regarding the quantities of water necessary for dust control.

7 Rebar/Concrete Removal and Grate Installation Assumptions

Under Alternatives 3 and 4, loose rebar and concrete would be removed from the buildings. Under Alternative 4, the first floors of Buildings 3, 5, and 6 would also be secured against access by installing bars, metal plates, or other materials over doors, windows, and other openings.

A B-1 crew would be used for removing concrete and rebar under both alternatives. This would include:

- 1 labor foreman;
- 2 laborers; and
- 2 cutting tools.

It was assumed that rebar and concrete removal would take 6 days for Alternative 3 and 2 days for Alternative 4.

An E-4 crew would be used to install metal grates over doors, windows, and other openings and includes:

- 1 structural steel foreman
- 4 structural steel workers;
- 1 equipment operator
- 1 equipment oiler; and
- 1 lattice boom crane

Table A-6 Estimated Material Removal and Grate Crew Days and Labor Hours

Alternative	Square Footage of Grate	Crew Days for Removal/Grates	Labor Hours for Removal/Grates
3 – Institutional Controls	-	6	144
4 – Selected Building Retention	12,902	20	640

8 Security Fencing Assumptions

Under Alternative 3, it was assumed that a security fence would be installed around the entire site perimeter. Security fencing was also included under Alternative 4, with the enclosure of retained Buildings 3, 5, and 6. All fencing was assumed to be 8-foot-tall, Schedule 40 chain link industrial fencing with three strands of wire across the top. All fence posts were assumed to be galvanized steel spaced 10 feet apart and set in concrete. It was assumed that gates would be installed along the perimeter fence across five of the known access roads to the AFM. For the building enclosures, it was assumed that one gate would be installed along the fence for each of the three retained buildings. All gates were assumed to be 8-foot-tall double-swing gates with 12-foot openings.

A type B-80C crew, including the following personnel and equipment, was considered for fence installation activities:

- 2 laborers;
- 1 light truck driver;
- 1 1.5-ton, gas-powered flatbed truck; and
- 1 gas-powered manual fence post auger.

A type B-80 crew, including the following personnel and equipment, was considered for gate installation activities:

- 1 labor foreman;
- 1 laborer;
- 1 light truck driver;
- 1 light equipment operator;
- 1 3-ton, gas-powered flatbed truck; and
- 1 truck-mounted earth auger.

The estimated daily output for the fencing crew was 180 linear feet of fencing. Approximately two openings could be gated daily by the gate installation crew. These values were used to estimate the number of crew days and labor hours needed to install fencing and gates under Alternatives 2 and 4. A summary of the total linear feet of fencing, number of gates, crew days, and labor hours required for site security is provided in Table A-7.

Table A-7 Estimated Site Security Crew Days and Labor Hours

Alternative	Fencing (Linear Feet)	Number of Gates	Crew Days for Fencing & Gates	Labor Hours for Fencing & Gates
3 – Institutional Controls	3,354	5	21	522
4 – Selected Building Retention	1,598	3	12	259

9 Operation and Maintenance Assumptions

Operations and Maintenance (O&M) assumptions include the cost of BLM security patrol under Alternative 1, full time security under Alternative 3, and fence and sign replacement under Alternatives 1, 3, and 4. For all alternatives, sizes of buildings, acreage, etc., are consistent with the USACE report (USACE 2010).

The hourly cost for security patrol was taken from Means (2010) and includes salary. For Alternative 1, it was assumed that the security patrol would patrol the site for approximately 60 hours per month. For Alternative 2, it was assumed that the security patrol would be at the site for 24 hours per day, seven days per week.

Fence assumptions (Means 2010) included repair of an industrial Schedule 40 chain link fence, 8 feet high with 3 strands of 6 gauge wire for Alternatives 3 and 4 and for Alternative 1, an industrial chain link fence, 6 feet high. For all alternatives it was assumed that approximately 20

percent of the fencing would require repairs. All labor, equipment, and supply costs are from Means (2010).

For Alternatives 1 and 3 it was assumed that 25 signs would need to be replaced each year. These signs were assumed to be 24 x24 inches and reflective. It was assumed that only 16 signs would need replacing for Alternative 4. All labor, equipment, and supply costs are from Means (2010).

Vegetative cover repair assumptions for Alternatives 2 and 4 include that 5 percent of the cover will need to be repaired. All labor, equipment, and supply costs are from Means (2010).